

Office Action Summary

Application No.

10/575,759

Applicant(s)

HENNIGE ET AL.

Examiner

Zachary Best

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-9 and 12-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-9, 12-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

**ELECTRIC SEPARATOR COMPRISING A SHUTDOWN MECHANISM,
METHOD FOR THE PRODUCTION THEREOF, AND USE IN LITHIUM
BATTERIES**

Examiner: Z. Best S.N. 10/575,759 Art Unit: 1795 October 14, 2008

DETAILED ACTION

1. Applicant's amendment filed on August 13, 2008 was received. The specification was amended. Claims 1 and 10-11 were cancelled. Claims 2-9 and 12-24 were amended. Claims 25-26 were newly added.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

3. The objection to the specification is withdrawn because the abstract was amended.

Claim Objections

4. The objections to Claims 4 and 10 are withdrawn because Claim 4 was amended and Claim 10 was cancelled.

Claim Rejections - 35 USC § 112

5. The claim rejections under 35 U.S.C. 112, second paragraph, of Claims 1, 3, and 23 are withdrawn because Claim 1 was cancelled and Claims 3 and 23 were amended.

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 2-9 and 12-26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding Claim 25, the claim recites "in the porous inorganic nonelectroconductive coating the particles are adhered together by an oxide of Al, Si, or Zr." However, it is noted that in the instant specification adherence together by oxides of only Zr or Si are discussed (par. 36, pg. 7, line 17). It is noted that Applicant alleges support for adherence by an oxide of aluminum can be found in the instant specification (pg. 10, lines 24-31). However, the intended support discusses only suspending oxide particles of Al, Si, and/or Zr in a sol of Al, Zr, and/or Zr. No discussion is given regarding adherence by an oxide of aluminum.

Regarding Claim 5, the claim recites "mixtures thereof." Examiner notes that the instant specification allows for the fibers to be mixtures of polyolefins (par. 35, pg. 6, lines

30-31), but no mention is made of a mixture of, for example, a polyamide with a polyester.

If Applicant believes these rejections were made in error, Examiner requests Applicant point, with specificity, to where Applicant believes said recitation is reasonably conveyed.

8. Claims 2-9 and 12-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding Claim 25, the claim recites “the shutdown layer will melt at a temperature determined as the shutdown temperature of the electrical separator.” However, no relation is given as to how “the shutdown temperature of the electrical separator” is defined. Furthermore, if the shutdown layer causes the shutdown of the separator then the shutdown temperature will be the temperature at which the shutdown layer melts resulting in a circular and indefinite characterization. For purposes of compact prosecution, Examiner has read Claim 25 has “the shutdown layer will melt at a temperature.”

Claim Rejections - 35 USC § 102

9. The claim rejections under 35 U.S.C. 102(a) of Claims 1-5, 7-10, and 12-24 as being anticipated by Hennige et al. are withdrawn because Claim 1 was cancelled.

10. The claim rejections under 35 U.S.C. 102(c) of Claims 10, 13, and 16-22 as being anticipated by Shi et al. are withdrawn because Claim 10 was cancelled.

Claim Rejections - 35 USC § 103

11. The claim rejections under 35 U.S.C. 103(a) of Claims 1-9, 12, 14-15, and 23-24 as being unpatentable over Shi et al. in further view of Hying et al. are withdrawn because Claims 1 and 10 was cancelled.

12. Claims 2-9 and 12-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. (US 2005/0014063 A1) in view of Hying et al. (WO99/62620 A1) and Takita et al. (US 5,922,492 A). Subsequent references to Hying et al. are based on corresponding US 6,620,320 B1.

Regarding Claim 25, Shi et al. teach a battery separator for a lithium battery made from nonwoven polymeric fibers (abstract, par. 13) coated with a ceramic material (inorganic nonelectroconductive coating, par. 14), wherein said separator comprises a sheet of a porous shutdown layer (membrane, par. 12) that melts at a temperature and upon melting closes the pores of the nonwoven flat sheet (porous carrier, par. 11). The separator would be inherently nonelectroconductive because it could not function as a separator if it conducted electrons. However, Shi et al. do not specifically teach the nonwoven flat sheet (porous carrier) has a porosity greater than 50% or that the inorganic nonelectroconductive coating comprises particles in the range from 0.5-10 μm .

Hying et al. teach an ion-conducting separator comprising a porous carrier having a porous inorganic nonelectroconductive coating on and in said carrier (Hying et al. claim 22), the inorganic coating, which comprises oxide particle of the elements Al and/or Si (col. 6, lines 30-52), having an average particle size of at least $0.7\text{ }\mu\text{m}$ (col. 6, lines 62-63), and a support (carrier, claim 22) comprising woven or felted polymeric or glass fibers (col. 2, lines 57-67). It is advantageous to coat the porous carrier with the ion-conducting composite because it improves relation to acids and has improved high temperature resistance (abstract and col. 1, lines 42-45). Although Hying et al. do not teach that in the porous inorganic nonelectroconductive coating the particles are adhered together by an oxide of Si or Zr, the adhering material is inherent given the similar process steps used to create the coating (col. 5, lines 57-62), and furthermore, a coating of an oxide of Al and/or Si will inherently have particles of Al and/or Si adhered to other particles regardless of when said bonding occurred. A reference that is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. *In Re Roberston* 49 USPQ2d 1949 (1999). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the battery separator of Shi et al. with the porous inorganic nonelectroconductive coating of Hying et al. because Hying et al. teach that said coating will improve acid and high temperature resistance.

Takita et al. teach a separator for use in a nonaqueous battery (col. 1, lines 5-12), wherein the porosity of the membrane (separator) is 30-70% because the separator will retain good permeability (col. 2, lines 49-53). Therefore, it would have been obvious to one

having ordinary skill in the art at the time the invention was made to create the battery separator of Shi et al. wherein the separator had a porosity of 30-70% because Takita et al. teach that said separator with porosity of 30-70% will have good permeability. Alternatively, combining prior art elements according to known methods to yield predictable results is obvious. See *KSR v. Teleflex*, 127 S.Ct. 1727 (2007).

Regarding Claim 2, Shi et al. teach the shutdown layer is a porous film (par. 12).

Regarding Claim 3, Hying et al. teach the separator is bendable down to a radius of 1 mm (col. 5, lines 8-11) and Shi et al. teach the porous carrier has a thickness of 50 μm or less (pars. 11-12, see separator thickness and shutdown layer thickness).

Regarding Claim 4, Shi et al. teach the carrier is has polymeric fibers and is nonwoven (par. 13).

Regarding Claim 5, Shi et al. teach the polymeric fibers of the carrier are polyamides, polyacrylics (polyacrylonitriles), or polyesters (par. 13).

Regarding Claim 6, Shi et al. teach the shutdown layer is 0.01 to 10 μm (par. 12).

Regarding Claim 7, Shi et al. teach the shutdown layer is a polymer or polymer blend (par. 12).

Regarding Claim 8, Shi et al. teach the shutdown layer consists of a material which has a melting temperature of less than 130°C (par. 11).

Regarding Claim 9, Shi et al. teach the material of the shutdown layer and at least portions of the material of the carrier are identical (par. 12-13, e.g., both may be polyamides).

Regarding Claims 23-24, Shi et al. teach the battery comprising said separator (abstract).

Regarding Claims 12-22 and 26, Shi et al. in view of Hying et al. and Takita et al. teach the battery separator for a lithium battery as recited above. It is noted that Claims 12-22 and 26 are product-by-process claims. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed.Cir. 1985). The battery separator taught by Shi et al. in view of Hying et al. and Takita et al. is obvious to that of Applicant's, and therefore, Applicant's process is not given patentable weight in this claim.

Double Patenting

13. The provisional claim rejections, on the grounds of nonstatutory obviousness-type double patenting, of Claims 1, 3-5, 7, and 23-24 are withdrawn because Claim 1 was cancelled.

Response to Amendment

14. Applicant's arguments filed on August 13, 2008 have been fully considered, but they are not persuasive:

Applicant argues:

(a) Shi et al. and Hying et al. are different technologies (i.e., nonanalogous art), and therefore impermissibly combined.

In response to Applicant's arguments:

(a) Shi et al. teach a battery separator, which must ionically conduct ions between the anode and cathode with which the separator separates (pars. 7 and 15). Therefore, the invention of Shi et al. would fall under the genus of the invention of Hying et al. of ion-conducting materials (Hying et al. abstract). Hying et al. directly mentions fuel cells (an electrochemical device similar to a battery) and more broadly mentions the ion-conducting materials of its invention may be used for other electrochemical reactions (col. 1, lines 7-19). Therefore, one skilled in the art would have looked in the general field of ion-conducting materials to modify a subset of ion-conducting materials, such as battery separators. Thus a reference in a field different from that of applicant's endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole. *KSR International Co. v. Teleflex, Inc.*, 82 USPQ 2d 1385, 1397 (2007). See also MPEP 2141.01(a).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

zpb

/Dah-Wei D. Yuan/
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